Alaska Department of Environmental Conservation
Spill Prevention and Response Division

How to Interpret Laboratory Data

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Glossary

kilogram: 1,000 grams

***matrix*:** the type of sample (water, soil, sediment, etc.)

***maximum contaminant level (MCL)*:** the highest level of contamination allowed in public drinking water. MCLs are designed to protect human health.

method detection limit (MDL): the lowest concentration (greater than zero) of the substance tested that can be measured and reported with 99 percent confidence

***method reporting limit (MRL)*:** the lowest concentration of the substance tested that can be reported reliably under normal laboratory conditions

µg/L or kg: micrograms per liter or kilogram; 1/1,000,000th of a gram

mg /L or kg: milligrams per liter or kilogram; 1/1000th of a gram

non-detect (ND): the contaminant was not detected above the MDL

quality assurance/quality control (QA/QC): Quality assurance is the systematic process of checking to see whether a product or service being developed is meeting specified requirements. Quality control are the tools used to monitor or regulate the process. Quality control is an aspect of quality assurance.

target compounds: the compounds being tested for

Reading laboratory data reports and interpreting their results can be confusing. We hope this fact sheet will make it more understandable. If you still have questions, contact your ADEC project manager or the laboratory that analyzed the samples. Most labs are very helpful in answering questions about their data.

Sections Found in a Lab Report

Lab reports typically have several sections. These sections may include: 1) the transmittal or cover letter, 2) the case narrative, 3) the analytical results, and 4) the quality assurance/quality control (QA/QC) sample results. QA/QC is performed to give a much greater confidence in the data. A lab report may also include a printout of the analytical instrument readings and evidence that the testing equipment was properly calibrated.

The transmittal letter and case narrative are sometimes combined into one section. The narrative explains any problems encountered in the analysis of the samples. The problems may or may not have affected the quality of the results. The analytical results section will show the analysis performed by the lab, the test result, and notes that indicate any problems encountered. These notes are called "data qualifiers." Most labs use a standard set of codes for data qualifiers (see page 2 for an explanation of data qualifiers).

What Do the Results Mean?

When you look at the report's analytical results section, you will see columns indicating the sample matrix (soil, water, etc), the contaminants tested for, and the test results. The results usually are reported in units of parts per million (ppm, mg/L or mg/kg), parts per billion (ppb, µg/L or µg/kg), or percentages. If the contaminant was not found, the column will show "ND" for not detected.

The abbreviation ND is often followed by a number, such as ND (0.5). This does not necessarily mean that the chemical was actually there. It means simply that anything below 0.5 ppm or ppb (whichever units were used for that analysis) would not have been found because it was below the test equipment's detection limit.

When dealing with drinking water, another column that may be shown is the "maximum contaminant level (MCL)." This number is the highest level of contamination considered acceptable in drinking water. If the number on your result is less than the MCL, your drinking water is considered acceptable. If the

Common Data Qualifiers:

Data qualifiers are used in lab reports to indicate a problem or irregularity with the analytical result. The most common qualifiers are shown here; most labs also will use footnotes to explain the qualifiers they have used.

J: The number is an estimated concentration because something in the sample interfered with the analysis.

U: The contaminant was not detected at a concentration greater than the detection limit.

UJ: The contaminant was not detected, but the detection limit is estimated because of interference from something in the sample.

R: The data are unusable. Resampling and reanalysis are necessary for verification.

Reference List

Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods (SW 846) Revision 4, January 1995

Fundamentals of Analytical Chemistry, Douglas A. Skoog, Donald M. West, Fourth Edition

This fact sheet is one of a series of free publications prepared by DEC to help people understand contaminated site cleanup issues.

MCL column is not present, ask your local DEC office about a regulatory standard for the contaminant. The detection limit of the equipment should be lower than the MCL. If not, you have nothing to compare your results to, and you should ask for a new test or evaluate other labs and/or methods.

Common Terms Used in Quality Assurance Reports

A lab report may include the results of the lab's QA/QC program. These results may be confused with the sample results unless you can recognize the terms and know what they mean. QA/QC tests you may see included in your lab report include:

Trip Blank: This is a sample container, often filled with distilled water. The trip blank travels unopened to the site with the empty sample containers and returns unopened to the laboratory with the samples. This is done to confirm that no contamination has been picked up during the "trip" to and from the sample location. If contamination is found in the trip blank, it means that the samples also may have been contaminated from a source outside the sample area. The trip blank should be non-detect (ND). If it isn't, your sample results may not be accurate, and a new test should be run.

Duplicate: A duplicate is a second sample, as identical as possible to the first one. The sampler will not usually tell the lab about a duplicate sample in order to check on how well the lab reproduces an analytical result. The test results for both samples should be the almost the same.

Surrogate: A lab will monitor its analytical system by "spiking" a sample with another chemical similar to the contaminant to be tested for. If a good percentage (usually 70-120%) of the surrogate chemical is recovered, it shows that the lab's test can accurately measure the contaminant sought. If you see "surrogate" results on your analysis report, it does not mean that particular chemical that was really in your sample.

Matrix Spike: Occasionally something in the sample itself — its soil, water, or sediment — interferes with the test for the contaminant. To check for that interference, a lab may conduct a "matrix spike" (and a matrix spike duplicate). A known amount of the same chemical being tested for is added to two extra samples before the analysis. If your report shows "matrix spike" data, check to see that the amount of chemical recovered is a good percentage (70-120%). If the percent recovery is low, it means that something in the matrix is interfering with the test, more work may need to be done to overcome the interference. The percent recovery corresponds to the chemical added, not to what was in the original sample. A non-spiked sample also is analyzed for that contaminant, so look for the result which does not include the spike.

For More Information

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